CLAIMS

What is claimed is:

1. An optical transmission system comprising:

(a) an optical transmitter including an input for receiving an encoding signal and an encoder arranged to encode an optical signal with any one of a plurality of encoding signatures according to the encoding signal;

(b) a transmission link for conveying the encoded optical signal from the optical transmitter; and

(c) an optical receiver comprising a grating decoder connected to receive the encoded optical signal from the input, the grating decoder incorporating a decoding signature matched to one of the encoding signatures so as to decode the encoded optical signal when encoded with the matched one of the encoding signatures.

2. A system according to claim 1, wherein the transmitter includes a modulator having drive electrodes and the encoding signal is an electrical signal connected to the drive electrodes.

3. A system according to claim 2, wherein the modulator is a phase modulator.

4. A system according to claim 2, wherein the modulator is an amplitude modulator.

5. A system according to claim 2, wherein the modulator is one of: an electro-acoustic modulator; and an electro-optic modulator.

6. A system according to claim 1, wherein the transmitter includes an optical delay line encoder.

7. A system according to claim 6, wherein the optical delay line encoder comprises one of: a fiber coupler, a fiber grating, a planar lightwave circuit (PLC) and an arrayed waveguide grating (AWG).

8. A system according to claim 1, wherein the transmitter includes an electrically driven laser source and the encoding signal is an electrical signal connected as a drive current to bias the laser source.

9. A system according to claim 1, wherein the grating decoder additionally incorporates a filtering function to compensate for signal distortions that result from the application of the encoding signal to the optical signal.

10. A system according to claim 1, wherein the grating decoder comprises a refractive index modulation induced grating.

11. A system according to claim 10, wherein the refractive index modulation induced grating is formed in an optical fiber.

12. A system according to claim 1, wherein the grating decoder is arranged in reflection in combination with a circulator.

13. A system according to claim 1, wherein the grating decoder is configured to decode a spread-spectrum encoded optical signal.

14. A receiver according to claim 1, wherein the grating decoder is configured to decode an OCDMA encoded optical signal.

15. An optical transmission method comprising:

(a) encoding an optical signal with any one of a plurality of encoding signatures according to an encoding signal;

(b) transmitting the encoded optical signal over a transmission link; and

(c) decoding the encoded optical signal using a grating decoder incorporating a decoding signature complementary to a matched one of the encoding signatures.

16. An optical transmitter comprising:

an optical source for generating an optical signal modulated with a content-bearing signal and having a predictable distortion characteristic induced during modulation of the optical signal; and

a grating decoder incorporating a filtering function configured to compensate for the distortion characteristic and arranged to process the optical signal to compensate for the distortion characteristic.